STANDARD CONSTRUCTION SPECIFICATIONS

DUCKS UNLIMITED

GREAT PLAINS REGIONAL OFFICE

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STANDARD CONSTRUCTION SPECIFICATIONS

2009 EDITION

GREAT PLAINS REGIONAL OFFICE

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201 MOBILIZATION

201.10 DESCRIPTION

The work shall include the supply of all labor, material and equipment to transport all needed labor, material and equipment to and from a project site to successfully complete that project as shown on the plans or described by the Engineer. When work consists of construction in a number of different locations at a given project site, mobilization shall include the transportation of the required labor, material and equipment between the various locations at the project site.

201.20 METHOD

The Contractor shall conduct all mobilization operations in a timely orderly, manner. Unless otherwise approved by the Engineer, mobilization operations shall commence no later than one week after the pre-construction meeting. Mobilization shall commence no later than one week after project completion and be finished within two weeks of project completion. During all operations, the Contractor is responsible for maintaining public and private property in original condition.

201.30 METHOD OF MEASUREMENT

Mobilization shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Mobilization shall be measured in the following manner:

1) Lump Sum (LS): Mobilization shall be measured on a lump sum basis during completion of the entire project.
2) Each (EA): Mobilization shall be measured per (each) mobilization required to complete identified phases of a project that need to be completed at different construction times.

201.40 METHOD OF PAYMENT

The completed work for Mobilization, measured as specified, shall be paid for at the contract unit price. Payment shall be made according to the following schedule:

1) 25% of contract unit price at project start up.
2) 50% of contract unit price at half project completion.
3) 100% of contract unit price at project completion.

The unit price bid for mobilization shall include supplying all materials, equipment, labor and any incidental items necessary for performing all mobilization operations described in this specification. Unless separate mobilizations are required to completed different phases of the work shown on the plans, a Contractor may be eligible for a separate mobilization payment when the Contractor is required to discontinue work by the Corporation for reasons other than seasonal termination of work. The payment shall be commensurate to the amount of equipment and materials that are required to be removed from the project site and that payment shall not exceed the original unit price specified for mobilization.

202 SITE PREPARATION

202.10 DESCRIPTION

This specification shall cover the supply of all labor, materials, and equipment required for clearing and grubbing, and site preparation. The work shall include:

a) Removal from site and disposal of all trees, roots, brush, stone, rubbish and all other surface litter in designated areas by burying or burning.

b) Coordination of necessary clearing and grubbing operations to allow timely completion of construction staking of a project.

c) Grubbing to remove grass and debris.

d) Stripping of six (6) inches of topsoil and re-spreading after construction is completed, unless otherwise specified on the plans.

e) Final clean up of the site prior to demobilization will require the spreading and shaping of all materials stockpiled or moved to facilitate construction including but not limited to vegetative material.

202.20 CONSTRUCTION METHODS

Clearing shall consist of the cutting, removing, disposal and cleaning up of all timber, brush and fallen timber, stumps, shrubs, and rubbish. Trees and shrubs designated for preservation shall be marked and protected from scoring, barking or other injury during construction operations.

Grubbing shall consist of the removal and disposal of all roots, stumps, imbedded logs or objectionable debris to a depth of not less than twelve (12) inches below the original ground surface. Where no trees or brush exist, grubbing shall consist of removal of grass and debris prior to placement of fill material.

Topsoil stripping and stockpiling shall be performed for the footprint of all embankments and at the surface area of all excavations and at the base of temporary stockpiles and waste area unless otherwise noted on the plans. Unless otherwise specified, upon completion of the construction, the stockpiled material shall be spread and finished to a reasonably smooth surface.

Trees, logs, stumps, brush and other debris shall be burned and buried or chipped, or disposed of in areas designated by the Engineer. All burning is subject to local or state ordinances. Areas such as borrows, pits, and excavations so designated shall be left in a neat and finished appearance free from debris. All materials disposed of shall be covered with clean fill and leveled in such a way as to promote drainage.

202.30 METHOD OF MEASUREMENT

Site preparation shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Site preparation shall be measured in the following manner:

1) Lump Sum (LS): Site preparation shall be measured on a lump sum basis of site preparation operations. No separate measurement will be made for topsoil removal and replacement, clearing and grubbing or coordination of clearing and grubbing operations for construction staking.

2) Cubic Yard-Plan (CY-P): Site preparation shall be measured on a plan quantity basis of site preparation operations. This quantity shall be the neat line site preparation quantity for the specified depth at the footprint of the embankment or the surface area of potholes and channels as

calculated from the construction plans. This measurement shall not include clearing and grubbing or topsoil stripping and stockpiling of borrow areas as these quantities are considered incidental to embankment construction unless otherwise noted on the plans. No separate measurement for clearing and grubbing or coordination of clearing and grubbing operations for construction staking will be made.

3) Cubic Yard-Staked Quantity (CY-S): Site Preparation shall be measured on a staked quantity basis of site preparation operations. This quantity shall be the area of work, as determined by superimposing the construction staking notes on the original ground elevations, multiplied by the specified depth. This measurement shall not include clearing and grubbing or topsoil stripping and stockpiling of borrow areas as these quantities are considered incidental to embankment construction unless otherwise noted on the plans. No separate measurement for clearing and grubbing or coordination of clearing and grubbing operations for construction staking will be made.

4) Linear Feet (LF): Site preparation shall be measured on a linear feet basis. The length shall be the actual staked centerline distance of site preparation completed according to plans and specifications.

5) Acre (AC): Site preparation shall be measured on an acre basis. The dimension shall be the actual staked outside dimensions of site preparation completed according to plans and specifications.

6) Hourly-Recorded (HR-R): Site preparation shall be measured on a per diem basis. The per diem basis shall be the actual hours as recorded from an approved rpm/hr recording system for each piece of equipment used to complete the excavation portion of this project. No separate recording shall be made for mobilization and idling of equipment, unless otherwise specified.

When Site Preparation is not listed on the Standard Bid Form or when a unit price bid has not been entered for Site Preparation, it shall be considered incidental to the excavation, embankment, structure, and piping operations and no measurement shall be made.

202.40 METHOD OF PAYMENT

The completed work for site preparation, measured as specified, shall be paid for at the contract unit price. The unit price bid for site preparation shall include supplying all materials, equipment, labor and any incidental items necessary for performing all site preparation operations described in this specification.

203 EXCAVATION

203.10 DESCRIPTION

This specification shall cover the supply of all labor, materials, and equipment required for the excavation, hauling and spreading of materials from within the limits of the cut area as shown on the plans, including but not limited to, excavation of designated areas; peninsula cutoffs; silt removal; pothole and dugout construction; and key trench construction. The work shall include control of water during excavation, the shaping of slopes to the lines and grades shown on the drawings and the disposal of materials within designated areas. Unless otherwise specified, all material to be excavated shall be considered unclassified regardless of their nature or the manner in which they are removed. In the case that drilling and blasting is required, due to size of density of rock encountered, extra work will be considered.

203.20 CONSTRUCTION METHODS

203.21 SITE PREPARATION

Prior to any excavation, sites shall be cleared and grubbed with topsoil removed in accordance with the specification for **SITE PREPARATION**. Material cleared and grubbed shall be disposed of per the Engineer's directions. Topsoil removed shall be stockpiled and later re-spread on those areas at a thickness of four (4) inches, unless otherwise specified.

203.22 EXCAVATION

Excavation shall mean the removal of all materials encountered within the limits of excavation as shown on the drawings or as staked by the Engineer. Excavation shall be performed in as nearly a continuous operation as possible, trimmed and leveled to conform to the required lines, grades and tolerances. Areas over-excavated shall be replaced with suitable materials compacted to a density at least equal to that of the in-situ material or to the satisfaction of the Engineer.

Suitable material excavated from the excavation areas shown on the plans shall be used in any embankments called for on the plans. This shall include areas stripped of topsoil or unsuitable material that need to be backfilled with suitable material or key trenches. Placement of these embankments or backfills shall be done in accordance with the specification for **EMBANKMENT CONSTRUCTION**.

Excavated material unsuitable for embankments shall be deposited in locations shown on the plans or as directed by the Engineer. Unsuitable excavated materials shall be deposited as uniformly and continuously as possible in successive layers. No specific compaction will be required but where the material is placed with equipment other than tractor scrapers, blading and leveling is required to minimize voids. The fill shall be leveled upon completion to conform to lines and grades and enable the area to be seeded.

Rock excavation operations shall be controlled by the Contractor to produce the size gradations specified for other parts of the work, if the rock is designated by the Engineer as suitable for use.

203.23 DISPOSAL OF WASTE MATERIALS

All surplus or unsuitable excavated materials designated as waste by the Engineer shall be disposed of at the locations shown on the plans or as directed by the Engineer.

203.24 CONTROL OF SURFACE AND SUBSURFACE WATER

The Contractor is responsible for control of surface water, subsurface water, and drainage during the construction period. All temporary fills, crossings, and culverts necessary to promote drainage during construction will be installed and removed at the Contractor's expense prior to acceptance of the work. Any claims arising from upstream or downstream damages as a result of the construction or failure of these temporary works will be the Contractor's responsibility.

It is the responsibility of the Contractor to control the surface and sub-surface water and drainage in any excavation area, dewatering placement area and borrow area. Should material quality lessen through inadequate drainage, the Contractor may be directed by the Engineer to construct drainage facilities or develop an alternate borrow area at the Contractor's expense.

203.30 METHOD OF MEASUREMENT

Excavation shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. No measurement for over-excavation shall be made. Excavation shall be measured in the following manner:

1) Lump Sum (LS): Excavation shall be measured on a lump sum basis and no separate measurement shall be made for the volume of material excavated.
2) Cubic Yards-Plan Quantity (CY-P): Excavation shall be measured on a plan quantity basis. This quantity shall be the neat line excavation quantities calculated from the construction plans.
3) Cubic Yards-Staked Quantity (CY-S): Excavation shall be measured on a staked quantity basis. The quantity shall be calculated by superimposing construction staking notes on original ground and using average end area methods of volume calculation.
4) Cubic Yards (CY): Excavation shall be measured on a volume basis. The volume to be paid for shall be made by superimposing final cross- sections on applicable stripped or original ground profile sections and using average end area methods of volume calculation. No measurement for overexcavated materials shall be made.
5) Linear Feet (LF): Excavation shall be measured on a linear feet basis. The length shall be the actual staked centerline distance of excavation completed according to plans and specifications.
6) Hourly-Recorded (HR-R): Excavation shall be measured on a per diem basis. The per diem basis shall be the actual hours as recorded from an approved rpm/hr recording system for each piece of equipment used to complete the excavation operations. No separate recording shall be made for mobilization and idling of equipment, unless otherwise specified.

When a unit price bid has not been entered for Excavation, it shall be considered incidental to the embankment, structure, and piping operations and no measurement shall be made.

203.40 METHOD OF PAYMENT

The completed work for excavation, measured as specified, shall be paid for at the contract unit price. The unit price bid for excavation shall include supplying all materials, equipment, labor and any incidental items necessary for performing all excavation operations described in this specification. No payment shall be made for dewatering or the control and drainage of surface/sub-surface water. No payment for excavation of suitable material will be made when excavating in a designated borrow area to obtain material that is to be placed, measured and paid in accordance with the specification for **EMBANKMENT CONSTRUCTION**.

204 EMBANKMENT CONSTRUCTION

204.10 DESCRIPTION

The work shall include the supply of all labor, material and equipment required to complete the construction of key trenches, dams, dikes, berms, levees or roadway embankments as shown on the plans and as staked in the field. The work shall include:

a) Excavation of suitable materials from borrows or excavations.

b) Placement of materials from designated borrow areas or excavation into embankments such as dams, dikes, berms, levees or roadways.

c) Leveling and trimming of embankments and borrow areas.

204.20 CONSTRUCTION METHODS

204.21 SITE PREPARATION

Prior to any embankment or key trench construction, sites shall be cleared and grubbed with topsoil removed in accordance with the specification for **SITE PREPARATION**. Material cleared and grubbed shall be disposed of per the Engineer's directions. Topsoil removed shall be stockpiled and later re-spread on those areas at a thickness of four (4) inches, unless otherwise shown on the plans.

204.22 FILL MATERIAL

Unless otherwise specified, all material shall be placed in loose lifts of not more than eight (8) inches thickness and shall be compacted by suitable compaction equipment to a minimum of 95% of maximum density as determined by the Standard Proctor Method ASTM D698. Moisture content shall be in the range of -l% to +3% of optimum moisture content. Field tests conforming to standard ASTM testing methods will be scheduled at the discretion of the Engineer to ensure compliance with these specifications.

If material is placed into embankments during freezing conditions, any frost developed during embankment construction shall be removed prior to continuing fill operations. Embankments shall not be constructed during periods when the embankment material freezes while being placed and compacted.

Fill material shall be free from boulders, concrete, snow, stumps or other vegetation.

204.23 KEY TRENCH CONSTRUCTION

The Contractor shall not commence key trench construction until such work as specified in the specification for **SITE PREPARATION** has been completed to the satisfaction of the Engineer.

Where specified on the plans, the key trench excavation shall be made to the lines and grades shown on the drawings but may be altered during construction upon the direction of the Engineer to adjust for variation in soil conditions. Excavated material, if acceptable in quality to the Engineer, may be stockpiled for use in site preparation or embankment construction. Unacceptable materials shall be disposed of by placing into designated areas. The key trench completed to the original ground surface elevation shall be rough leveled prior to commencing embankment construction.

204.24 EMBANKMENT CONSTRUCTION

The Contractor shall not commence embankment construction until such work as specified in the specification for **SITE PREPARATION** and the key trench, where specified, has been completed to the satisfaction of the Engineer.

Embankment material excavated from ditches/borrows with tractor-scraper units shall be placed in successive layers across the entire width of the embankment. Each layer must be spread as deposited longitudinally along the embankment with each layer not exceeding eight (8) inches in thickness. With the Engineer's approval, the initial layer may be increased in thickness in wet areas to provide a working pad capable of supporting the hauling equipment. The embankment at all times must be maintained in a reasonably level condition and hauling equipment shall be directed over the full width of each layer to facilitate uniform compaction. Adequate equipment shall be used to obtain the minimum compaction specified in Section 204.22 of this specification.

Where embankment material is excavated with bucket equipment from ditches or borrow, it shall be deposited into the embankment within reach of the equipment. To prevent berm failure, stock piling on berms will not be permitted. Materials shall be placed and spread in layers with each layer after spreading not to exceed eight (8) inches in thickness.

All embankments will be construction staked to final grade elevations shown on the drawings. Embankments shall be brought to these elevations using embankment material graded to a tolerance of +/- 0.1 feet. Topsoil or riprap materials are to be placed on top of embankment construction. Topsoil depths shall be four (4) inches, unless otherwise specified, while riprap depths shall be as specified on the drawings. All embankment construction must be as continuous as possible and the fill maintained such that drainage is assured at all times.

Should fill settlement occur during the construction of the embankment and within seven days of substantial completion, and prior to acceptance of the work, additional material shall be placed and trimmed to achieve final grade by the Contractor at his own expense. After embankments have been constructed to grade, they shall be leveled and trimmed to conform to the lines, grades and cross-sections shown on the plans and/or as staked. Acceptance of finished embankment may be made progressively during the course of construction upon the request of the Contractor. A completed embankment once accepted by the Engineer shall not be used by the Contractor for haulage, access or other purposes without the consent of the Engineer.

Water used in conjunction with embankment construction activities shall be applied and paid as described in the specification for **WATER**.

Cold weather embankment construction - Embankment construction may not proceed if material freezes while being placed and compacted however when weather conditions are such that embankment construction may proceed, the contractor may be permitted to excavate any frozen foundation soils or previously installed fill and proceed with the embankment construction for so long as weather will permit, but only if and to the extent approved by the engineer and with the understanding that additional costs involved shall be borne by the contractor. The frozen soil shall be wasted and replaced with other suitable soil as may be necessary to construct the embankments as specified.

204.25 TRIMMING

The crest, side slopes and berms of the embankment shall be leveled and trimmed to conform to the lines and grades shown on the drawings. The crest shall be constructed to the elevation shown on the plans prior to acceptance of the work. Acceptance of the finished embankment may be made progressively

during the course of construction upon the request of the Contractor. Once accepted by the Engineer, the Contractor shall not use a completed embankment for haulage, access or other purposes.

204.26 HAUL ROADS AND BORROW AREAS

The construction, maintenance and removal of all haul roads from the borrow areas shall be the responsibility of the Contractor and be considered incidental to the work. Borrow areas shall be maintained during construction in a graded condition such that drainage is assured and that operations can resume quickly after precipitation periods. No borrow shall be obtain outside of designated borrow areas or designated depths or elevations without approval from the engineer, responsible agency and landowner. Following completion of the work, borrows are to be left in a graded condition acceptable to the Engineer and all haul roads, access roads and temporary crossings are to be removed.

204.27 CONTROL OF SURFACE AND SUBSURFACE WATER

The Contractor is responsible for control of surface water, subsurface water, and drainage during the construction period. All temporary fills, crossings, and culverts necessary to promote drainage during construction will be installed and removed at the Contractor's expense prior to acceptance of the work. Any claims arising from upstream or downstream damages as a result of the construction or failure of these temporary works will be the Contractor’s responsibility.

It is the responsibility of the Contractor to control the surface and sub-surface water and drainage in any excavation area, dewatering placement area and borrow area. Should material quality lessen through inadequate drainage, the Contractor may be directed by the Engineer to construct drainage facilities at the Contractor’s expense.

204.30 METHOD OF MEASUREMENT

Embankment construction shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. No measurement for embankment constructed beyond the staked limits will be made. Embankment construction shall be measured in the following manner:

1) Lump Sum (LS): Embankment shall be measured on a lump sum basis of placed embankment. No separate volume measurement shall be made.

2) Cubic Yard-Plan Quantity (CY-P): Embankment shall be measured on a plan quantity basis. This quantity shall be the neat line quantity of placed embankment including site preparation calculated from the construction plans. This measurement shall also include site preparation quantities. Site preparation quantities to be added to embankment quantities shall be calculated as described in the specification for **SITE PREPARATION**. This measurement shall not include clearing and grubbing or topsoil stripping and stockpiling of borrow areas as these quantities are considered incidental to embankment construction.

3) Cubic Yard-Staked Quantity (CY-S): Embankment shall be measured on a staked quantity basis of placed embankment. This quantity shall be measured by superimposing the construction staking notes on the original ground elevations and using the average end method of volume calculation. This measurement shall also include site preparation quantities. Site preparation quantities to be added to embankment quantities shall be calculated as described in the specification for **SITE PREPARATION**. When indicated on the plans or unit table, an appropriate shrinkage factor will be applied to this calculation. This measurement shall not include clearing and grubbing or topsoil stripping and stockpiling of borrow areas as these

quantities are considered incidental to embankment construction unless otherwise indicated on the plans or unit price table.

4) Cubic Yards (CY): Embankment shall be measured on a volume basis of placed embankment. The volume to be paid for shall be made by cross sectioning designated borrow areas minus topsoil quantities and using the average end method of volume calculation. No measurement shall be made for overbuild areas.

5) Linear Feet (LF): Embankment shall be paid on a linear feet basis. This quantity shall be measured by the actual staked centerline distance of all embankment constructed according to plans and specifications.

6) Hourly-Recorded (HR-R): Embankment shall be measured on a per diem basis. The per diem basis shall be the actual hours as recorded from an approved rpm/hr recording system for each piece of equipment used to complete the embankment operations. No separate recording shall be made for mobilization and idling of equipment, unless otherwise specified.

No separate measurement shall be made for the fill around pipes, pipeline, and water control structures. This work shall be considered incidental to those bid items.

204.40 METHOD OF PAYMENT

The completed work for embankment construction, measured as specified, shall be paid for at the contract unit price. The unit price bid for embankment construction shall include supplying all materials, equipment, labor, and any incidental items necessary for performing all embankment construction operations described in this specification. No payment shall be made for dewatering or the control and drainage of surface/sub-surface water.

205 WATER

205.10 DESCRIPTION

The work shall include the supply of all labor, material, and equipment required to add water to embankments as directed by the Engineer. The work shall include:

a) Locating and procuring a suitable water source.

b) Delivery of water to the site, applying and mixing water with embankment material.

205.20 MATERIALS

Water used for construction shall be reasonably clean and shall not affect normal soil characteristics.

205.30 CONSTRUCTION METHODS

Water shall be applied to the embankment areas (or borrow areas) in a way that maintains the specified moisture content. Sufficient equipment shall be on the project site to secure and maintain the specified moisture content until the required density is secured. Water shall be applied uniformly over the working area.

205.40 METHOD OF MEASUREMENT

Water shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Water shall be measured in the following manner: **Note MGAL is defined as 1000 gallons**.

1) Lump Sum (LS): Water shall be measured on a lump sum basis for applied water. No separate measurement shall be made.

2) MGAL - Plan Quantity (MG-P): Water shall be measured on a plan quantity basis. The quantity shall be the one thousand gallon (KGAL) increments as calculated using soil investigation information and listed on the plans or shown on the Standard Bid Form. No measurement shall be made for the volume of water applied.

3) MGAL - (MG): Water shall be measured on a volume basis. The water measured shall be the actual amount of applied water in one thousand-gallon (KGAL) increments used in the construction of the project. The amount used shall be measured in the field as agreed to by the Contractor and the Engineer.

205.50 METHOD OF PAYMENT

The completed work for water, measured as specified, shall be paid for at the contract unit price. The unit price bid for water shall include supplying all materials, equipment, labor and any incidental items necessary for performing all water operations described in this specification.

305 RIPRAP, REVETMENT & AGGREGATE PLACEMENT

305.10 DESCRIPTION

This work shall consist of supply and placement of rock riprap, filterstone, concrete revetment or other aggregate as protective covering along the side slopes, bases of channels, slopes around culverts, and on embankments or such other places as may be indicated on the plans, as specified herein, or as directed by the Engineer.

305.20 MATERIALS

305.21 BEDDING MATERIAL

Where called for on the plans and unless otherwise specified, material used for bedding shall be well-graded sand and gravel with the following gradation:

Percent (%) Passing by Weight				
3" Sieve	1" Sieve	1/2" Sieve	#4 Sieve	#100 Sieve
100	75-85	45-65	15-35	0-15

The bedding material shall be from a source approved by the Engineer.

305.22 FILTER FABRIC

Unless otherwise specified, filter fabric shall be utilized, and considered incidental, in the installation of all riprap and revetment. The filter fabric shall be a nonwoven polyester or polypropylene geotextile. This geotextile shall have a minimum grab tensile strength of 150 pounds as determined by ASTM D4632. The geotextile shall have a maximum opening size equivalent to a #70 U.S. standard sieve.

The contractor shall supply all pins and other items necessary to fasten the filter fabric to the ground so it will not slide or form gaps when placing rock riprap.

All materials shall be handled and stored in a careful and workmen-like manner to the satisfaction of the engineer.

For concrete revetment, the geotextile shall be bonded to the base of the concrete block mats with an overlap of two to three feet incorporated on one end and one side adjacent to each other.

305.23 RIPRAP

The contractor shall supply rock, which will consist of fieldstone or rough, unhewn quarry rock. Stone containing shale, sandstone, or other material that will disintegrate readily shall not be used. Class designations shall be based on the following gradations:

Riprap Class	Percent of Total Weight Smaller Than Given Size						
	30"	24"	18"	12"	9"	6"	3"
Class I	100	100	100	100	100	35-80	0-20
Class II	100	100	100	50-75	10-50	0-10	
Class III	100	100	50-75	10-50	0-10		
Class IV	100	85-100	60-80	20-40		0-20	

If the rock riprap class designation is not specified on the construction plans, CLASS I rock riprap shall be acceptable. The rock shall be approved by the Engineer prior to installation.

305.24 CONCRETE BLOCK REVETMENT

Concrete block revetment systems shall be supplied in a manner that meets the requirements as specified on the plans. Unless otherwise specified, the concrete shall be in accordance with the specification for **CAST-IN-PLACE REINFORCED CONCRETE.** The cables shall be stainless steel aircraft cable of Type 302 or 304 stainless and of Type 1 x 19 construction. Stainless steel clamps of the type and number recommended by the revetment manufacturer shall be provided. Anchors shall be provided in accordance with the manufacturer's recommendations.

305.25 OTHER AGGREGATE

Any other aggregate as called for on the plans shall be supplied in a manner that meets the gradation as specified on the plans. The rock shall be approved by the Engineer prior to installation.

305.30 CONSTRUCTION METHODS

305.31 SUBGRADE PREPARATION

The areas on which the rock, revetment or other aggregate is to be placed shall be graded to the lines shown on the plans. The soil surface shall be smooth and free from any obstructions to provide adequate contact area between the soil and the bedding material or filter fabric.

305.32 BEDDING MATERIAL

When called for on the plans, a six (6) inch layer of bedding material shall be placed as shown prior to the placing of any riprap or revetment.

305.33 FILTER FABRIC

The filter fabric shall be placed under all riprap in such a way that there is adequate contact area between the soil and the fabric. Installation shall start on the downstream end of the slope. Pins shall be installed to prevent the filter fabric from sliding or forming gaps during installation of the filter material and placement of the rock riprap.

When filter fabric is to be placed on a slope, an anchor trench shall be constructed on the top of the slope and a toe trench shall be constructed on the lower end of the installation. The trenches shall be perpendicular to the slope and must be at least one foot wide and one foot deep. The filter fabric shall be placed in the anchor trench and the toe trench. The trenches shall be backfilled and compacted to adequately anchor the filter fabric.

Where a seam is needed to provide a continuous coverage of the filter fabric, the two pieces of filter material shall be overlapped a minimum of two feet. Pins shall be placed in the overlap area to prevent slipping during placement of the filter material and rock riprap.

Great care shall be taken to protect the filter fabric from damage either from the wheels or tracks or any sliding caused by the equipment.

The fabric shall not be exposed to the sun for more than seven days. If the fabric meets the requirements of ASTM D4255, less than 30% strength loss at 500 hours, the maximum exposure shall be 30 days.

305.34 RIPRAP

Riprap shall be placed by equipment capable of controlling the drop of the rock riprap. The maximum drop of the rock shall be three (3) feet. Pushing or rolling rocks over the geotextile will not be allowed. Placement will be in such a manner that the smaller stones will be uniformly distributed throughout the mass. Sufficient handwork shall be done to provide a neat and uniform surface, with the depth being specified herein and as shown on the plans. The surface may not vary from the theoretical surface by more than 4" at any point for riprap, unless otherwise specified.

305.35 CONCRETE BLOCK REVETMENT

The concrete revetment mats shall be laid from the downstream end of the project to the upstream end to ensure the geotextile joints are shingled to direct flow over the joint and prevent undermining. The gaps between each mat shall not be greater than two (2) inches or they shall be filled using a grout mixture as recommended by the manufacturer. The outside edges of the mat system shall be entrenched and buried at least one block into the ground. After installation of the mat system, the top surface shall be covered with topsoil and seeded, if specified on the plans.

305.36 OTHER AGGREGATE

Upon completion and approval of the subgrade preparation by the Engineer, the aggregate shall be placed and compacted on the prepared subgrade to the dimensions shown on the plans. The location and method of placement shall be shown on the plans. Equipment used for placement operations shall be approved by the Engineer.

305.40 METHOD OF MEASUREMENT

Riprap, revetment and aggregate placement shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Riprap, revetment and aggregate placement shall be measured in the following manner:

1) Lump Sum (LS): Riprap revetment and aggregate placement shall be measured on a lump sum basis of placed riprap. No measurement for volume or weight shall be made.
2) Square Yard (SY): Riprap, revetment and aggregate placement shall be measured on a square yard basis. The quantity shall be the neat line measured quantity of the finished surface completed and accepted in-place, at the specified thickness. No separate measurement shall be made for excess riprap or aggregate.
3) Cubic Yard - Plan (CY-P): Riprap and aggregate placement shall be measured on a cubic yard-plan basis. The quantity shall be the neat line quantity of installed riprap material calculated from the construction plans. No separate measurement shall be made for excess riprap or aggregate.
4) Ton (TN): Riprap and aggregate placement shall be measured on a ton basis. The measurement shall be made by the collection of weight tickets from the supplier and shall be based on the short ton. Measurement shall be based on the actual amount of placed riprap or other aggregate. No measurement shall be made for excess rock.

No separate measurement shall be made for the filter fabric or bedding material used in the riprap placement. The supply and installation of these materials shall be considered incidental to the riprap placement.

305.50 METHOD OF PAYMENT

The completed work for riprap, revetment and aggregate placement, measured as specified, shall be paid for shall be paid for at the contract unit price. The unit price bid for riprap, revetment and aggregate placement shall include supplying all materials, equipment, labor, and any incidental items necessary for performing all riprap and aggregate installation operations described in this specification.

307 SHEET PILING

307.10 DESCRIPTION

The work in this section shall consist of furnishing and installing the specified kinds and types of sheet piling at the location(s) shown on the plans. This shall include the furnishing of all labor, materials, tools, equipment, transportation, and any incidental items required to provide and install the sheet piling. This shall also include delivery of the sheet piling to the project site and removal of excess sheet piling from the project site.

307.20 MATERIALS

Sheet pile material shall be made of new, standard ASTM A36 grade steel, and be of the sections shown or specified on the plans. Alternate sheet piling may be used if approved by the Engineer and if it has a thickness and section modulus equal or greater than that specified on the plans. The sides of each piling shall be furnished with an interlock that is continuous for the full length of the pile. The interlock shall have an opening of sufficient width to allow free slippage of the adjoining sheet pile.

Sheet pile dimensions and weight variations shall be within the tolerances as shown on the plans. Unacceptable sheet pile shall not be driven.

A sufficient amount of sheet piling shall be provided to construct a structure of the dimensions shown on the plans. If an alternate sheet pile section is approved for use by the Engineer, then structure width dimensions may vary slightly. This variance (plus or minus) may not equal more than one section width of the original specified section. In addition, it is the Contractor's responsibility to ensure that the specified structural steel will fit the alternate sheet piling.

307.30 SHIPPING

Sheet pile material shall be obtained and supplied to the project site in a timely manner. Piling shall be handled in such a manner as to ensure no injury to the pile.

307.40 DRIVING

307.41 EQUIPMENT

The Contractor shall provide the necessary driving equipment that is capable of driving the specified sheet pile to the depth and alignment shown based on the soils information provided and knowledge of equipment capability.

Driving hammers may be drop, single acting, double acting, diesel, vibratory, or as approved by the Engineer. Drop hammers shall weigh between 1000-3000 lbs. with drops of 12 to 48 inches. Single acting, double acting and diesel hammers shall develop at least 7000 ft-lbs. with ram weights of at least 1400 lbs. Vibratory hammers shall be at least 40 hp and capable of driving at a minimum of 1000 vpm. Regardless of the type of hammer utilized, the energy developed by the hammer shall be of sufficient energy to adequately drive the sheet pile without damaging it.

Pile driver leads shall be of a type that will hold the pile and pile hammer in proper alignment during the driving operations and shall be long enough to preclude the necessity for the use of punches or chasers.

Leads for drop hammers shall be steel or steel shod. Generally, the recommendations of the pile hammer manufacturer shall be followed with respect to pile leads.

Piles shall be protected at all times from damage during driving. This shall include but is not limited to the use of suitable caps, rings, heads, blocks, and mandrels. A driving cap shall be used at all times and the heads of the steel piles shall be cut square to accept this cap. It will be the Contractor's responsibility to provide those items (driving heads, mandrels, etc.) necessary to drive special types of piles per pile manufacturer's recommendations.

307.42 DRIVING

The contractor will be required to provide the engineer a 24-hr. notification prior to the commencement of driving sheet pile. The piling shall be driven in such a manner as to ensure perfect interlocking throughout the entire length of each pile. The piles shall be held in proper alignment during driving by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose. Pre-excavation or trenching shall not be allowed.

All piles shall be driven to the depth shown or specified on the plans unless directed by the Engineer in the field. If a pile hits refusal prior to reaching the required depth and can no longer be driven without damage to the pile or driving it out of alignment then driving of the pile shall cease. Refusal shall be determined by inability of driving equipment to drive a pile more than one inch with four blows of the driving hammer operating at normal capacity. If a pile is starting to deform or move out of alignment prior to determining if it has hit refusal then driving shall also cease.

If it appears that a pile has encountered a boulder or some other obstruction within the first five feet of driving then the pile shall be pulled and the area excavated. The obstruction shall be removed if possible with the excavation backfilled and compacted prior to re-driving of the pile. If the obstruction cannot be removed then the excavation shall be backfilled and re-compacted with the pile re-driven to the obstruction unless the Engineer directs otherwise. In all cases of refusal the undriven portion of sheet pile shall be cut at shown or specified elevations and saved on site for inspection and measurement by the Engineer prior to removal of this material from the site by the Contractor.

Under no circumstances shall the top of the pile vary from the design centerline alignment by more than one inch (horizontal or vertical).

307.43 PILE CUTOFF

The Contractor shall cut the piles off at the elevations shown or specified on the plans. The head of each pile, after cutoff, shall be sound, undamaged material. The length of cutoff shall be sufficient to permit the removal of all damaged material.

307.44 DEFECTIVE PILES

Any pile damaged, driven out of its proper location, driven below the specified cutoff elevation or inaccurately cut off shall be corrected by one of the following methods, whichever is approved by the Engineer in the field.

a) The defective pile shall be pulled and replaced or re-driven.

b) A new pile shall be driven adjacent to the defective pile.

c) The defective pile shall be spliced or built up or a sufficient portion of the footing shall be extended to properly embed the pile.

All piles pushed up due to the driving of adjacent piles or by any other cause shall be driven down again to their specified elevation. Any sheet pile ruptured in the interlock, or otherwise damaged during driving, shall be pulled and replaced.

307.45 CORRECTIVE SURFACE HEAVE

Any excess material resulting from displacement of earth by pile driving shall be removed. Materials disturbed by pile driving shall be reconditioned and compacted to a density equal to that of the adjacent undisturbed material.

307.50 METHOD OF MEASUREMENT

Sheet piling shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Sheet piling shall be measured in the following manner:

1) Lump Sum (LS): Sheet piling materials and/or installation shall be measured on a lump sum basis of furnished and installed sheet pile material. No separate measurement shall be made for square feet of sheet pile material installed.
2) Square Feet - Plan Quantity (SF-P): Sheet piling materials and/or installation shall be measured on a plan quantity basis. The quantity shall be the neat line square feet of sheet pile material furnished and installed to design depths as measured from the construction plans.

The measurement for sheet piling installation shall be reduced for that amount of sheet pile material not driven to design depths. No separate measurement shall be made for installation of sheet pile material driven past design depths.

307.60 METHOD OF PAYMENT

The completed work for sheet piling materials and installation, measured as specified, shall be paid for at the contract unit price. The unit price bid for sheet piling materials and installation shall include supplying all materials, equipment, labor and any incidental items necessary for performing all sheet pile operations described in this specification or shown the plans.

309 STRUCTURAL STEEL

309.10 DESCRIPTION

The work of this section will cover the fabrications, supply and placement of the structural steel portions of the project. The work shall consist of supplying all labor, materials and equipment required to furnish and install catwalk, catwalk frame, stoplog channels, bracing, grating and sheet piling cap, all non driven H-pile, and all other structural steel frames shown on the plans.

309.20 MATERIALS

Catwalk metal grating shall be of the dimensions and type as shown on the plans. The grating shall be galvanized and attached to the structural steel frame as per the manufacturer's recommendations. Where aluminum catwalk grating has been specified, the aluminum shall be isolated from the steel at all points of contact in a manner acceptable to the Engineer.

All structural channels, angles, and plates specified shall be ASTM A36 steel.

Unless otherwise specified, handrail shall be 2" x 2" x 3/16" structural tubing or 1 1/2” schedule 80 steel pipe welded and painted.

Fasteners, bolts and anchors shall be ASTM A36 steel.

Arc-welding electrodes shall conform to the requirements of the American Welding Society Specifications for Iron and Steel Arc Welding Electrodes, latest edition.

309.30 FABRICATION

Fabrication shall be shown on the drawings. Weld all contact edges with a continuous 1/4” fillet weld. The technique, appearance and quality of all welds made shall conform to the American Welding Society code for Arc-Welding in Building Construction.

Shop drawings and a materials list shall be submitted for approval by the Engineer.

309.40 PAINTING

The catwalk, handrails, bracing, grating and miscellaneous steel shall be given one shop coat of zinc base primer and one coat of zinc base primer after erection is completed. Apply two coats of alkyd enamel flat black paint to all exposed structural steel surfaces. The non-driven H-piles, sheet piling cap and stoplog channels need not be painted.

309.50 METHOD OF MEASUREMENT

Structural steel shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Structural steel shall be measured in the following manner:

1) Incidental (INC): Supply and installation of the structural steel shall be considered incidental to the construction and installation of the associated water control structure and no measurement shall be made. This shall apply when structural steel is not listed on the Standard Bid Form.

2) Lump Sum (LS): Structural steel shall be measured on a lump sum basis of constructed structural steel. No separate measurement for pounds of steel required to construct the structural steel portion of a project shall be made.

3) Each (EA): Structural steel shall be measured on an individual structure basis. Measurement shall be made for each structure comprising the project and no separate measurement shall be made for pounds of steel used in construction.

No separate measurement shall be made for excess material used to construct design structures.

309.60 METHOD OF PAYMENT

The completed work for structural steel, measured as specified, shall be paid for at the contract unit price. The unit price bid for structural steel shall include supplying all materials, equipment, labor and any incidental items necessary for performing all structural steel operations described in this specification or shown on the plans.

311 REMOVAL OF EXISTING CULVERTS AND STRUCTURES

311.10 DESCRIPTION

The work of this section shall include the excavation, removal, cleaning, and stockpiling of culverts and structures designated to be removed.

311.20 CONSTRUCTION METHODS

311.2l EXCAVATION

Excavation shall be performed in a workmanlike manner, approved by the Engineer, to prevent damage to salvageable material.

311.22 DISMANTLING AND REMOVAL

The material shall be dismantled and removed in a careful and workmanlike manner. Equipment or facilities that may damage portions of the material shall not be used. Any salvageable material damaged by the Contractor, during the removal operation, by neglect or poor workmanship, shall be replaced or paid for by the Contractor. All salvageable material shall be cleaned, sorted and stored in an area designated by the Engineer. The Contractor shall prepare a list of all salvaged material.

311.23 DISPOSAL OF MATERIAL

All salvageable material shall be handled carefully to avoid damage. All material shall be piled neatly at a location, on site, as directed by the Engineer. All salvageable material as identified on the plans shall become the property of the owner and shall not be used by the Contractor for any of his construction operations. Non-salvageable materials shall become the property of the Contractor and removed from the site unless otherwise directed by the engineer.

311.30 METHOD OF MEASUREMENT

Removal of existing culverts and/or structures shall be measured on a unit basis. The unit shall be shown in the Unit Price Table of the Standard Bid Form for the pay item corresponding to this specification number. Removal of existing culverts and/or structures shall be measured in the following manner:

1) Lump Sum (LS): Removal of existing culverts and/or structures shall be measured on a lump sum basis of removed culverts and/or structures.
2) Each (EA): Removal of existing culverts and/or structures shall be measured on an individual basis. Measurement shall be made for each existing culvert or structure removed.
3) Linear Feet (LF): Removal of existing culverts and/or structures shall be measured on a linear foot basis. Measurements shall be made for each linear foot of existing culvert and/or structure removed.

311.40 METHOD OF PAYMENT

The completed work for removal of existing culverts and/or structures, measured as specified, shall be paid for at the contract unit price. The unit price bid for removal of existing culverts and/or structures shall include supplying all materials, equipment, labor and any incidental items necessary for performing

removal and salvage operations described in this specification or shown on the plans. No separate payment shall be made for disposal of removed culverts and/or structure